IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATEN T APPEALS AND INTERFERENCES

Applicant:	Prince et al.	
Serial No.:	10/766,225	
Filed:	January 28, 2004	Art Unit 3644
For:	Aircraft and Missile Forebody Flow Control Device	
Examiner:	Galen L. Barefoot	

August 11, 2006

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 11, 2006.

8/11/06 — Date
Kim Texters — Signature of Certifier
Kim Texters — Typed or printed name of certifier

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P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF TRANSMITTAL

Dear Sir:

Appellants' submit their brief as required under 37 C.F.R. §41.37. Please charge any required fees to our Deposit Account No. 502704. The Commissioner is hereby authorized to charge any deficiency or to credit any overpayment to Deposit Account 502704.

The Appellants' believe this Appeal Brief complies fully complies with 37 C.F.R. §41.37.

Respectfully submitted,

8/11/2006
Dated

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BRIEF ON APPEAL

Dear Sir:

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated April 6, 2006, in the application listed above. Appellant filed a response to Response After Final rejection and a timely notice of appeal on June 30, 2006.

I. REAL PARTY INTEREST

The real party in interest in this appeal is Orbital Research Inc., 4415 Euclid Avenue, Suite 500, Cleveland, Ohio 44103.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 1-20 are the subject of this Appeal. Claims 1-20 stand rejected.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a forebody flow control system and more particularly to an aircraft or missile flow control system for enhanced maneuverability and stabilization at high angles of attack. The present invention further relates to a method of operating the flow control system. See page 6, lines 3-5, 12-13 of the specification.

One of the many embodiments of the present invention is independent claim 1. Claim 1 provides a missile or aircraft forebody comprising an afterbody or forebody; at least one flow effector on the missile or aircraft forebody; at least one sensor each having a signal, the least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; and a closed loop control system; wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor. See page 8, lines 6-9; page 9, line 8; and page 11, lines 4-10. See drawings labeled FIG.1-4. Further embodiments of the present invention include the missile or aircraft of claim 1, wherein the closed loop system activates or deactivates the at least one flow effector, preferably by oscillation, to minimize side forces or to create commanded side forces on the missile or aircraft

forebody preferably at high angles of attack between 20 to about 60 degrees. See page 10, lines 19-27; and page 14, lines 22-28. See drawings labeled FIG. 3a, 3b, and 7.

Another embodiment of the present invention is independent claim 8. Claim 8 provides a flow control system for a missile or aircraft forebody comprising at least one activatable flow effector; at least one sensor having a signal, the at least one sensor being positioned to detect flow separation on the missile or aircraft forebody; an inertial measurement unit having an output; and a closed loop control system wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor and the output of the inertial measurement unit. See page 9, lines 20-25; page 13, lines 13-16; and page 14; lines 2-6. See drawings labeled FIG. 2-6. Further embodiments of the present invention include the flow control system of claim 8, preferably comprising at least four activatable flow effectors, and even more preferably comprising at least six flow effectors, positioned and separated equi-distantly about a center of the forebody of the missile or aircraft. Even further embodiments of the present invention include the flow control system of claim 8, wherein said flow effectors are preferably capable of being activated and deactivated at frequencies of at least 1 Hz, and more preferably at frequencies of at least 20 Hz; wherein the closed loop control system activates and deactivates the at least one flow effector to create additional side forces on the missile or aircraft forebody. See pages 6, lines 14-28; and page 7, lines 1-8, and 19-23.

Yet another embodiment of the present invention is independent claim 15. Claim 15 provides a method of stabilization for a missile or aircraft forebody comprising the steps of estimating or determining side forces on a missile or an aircraft forebody based

at least in part on a signal from at least one sensor, the at least one sensor being positioned to detect flow separation on the missile or aircraft forebody; the missile or aircraft forebody further comprising at least one flow effector and a closed loop control system for controlling the flow effectors; activating the at least one flow effector to counteract the side forces by oscillation of the at least one flow effector with the closed loop controller based on at least in part the signal of the at least one sensor; and re-estimating or determining side forces on the missile or aircraft forebody based at least in part on a signal from the at least one sensor; and deactivating the at least one flow effector in response to reduced or changed side forces. See page 14, lines 24-28. See drawings labeled FIG. 7. Further embodiments include the method of stabilization in claim 15, wherein the at least one flow effector is activated by oscillating the at least one flow effector; and/or the missile or aircraft comprises at least six activatable flow effectors positioned and separated substantially equi-distantly about a center of the forebody, and/or the at least one flow effector is only activated at angles of attack of the missile or aircraft forebody of between about 20 and 60 degrees, and/or the at least one flow effector is deployable. See page 14, lines 22-27; page 9, lines 23-27; page 10, lines 8-21. See drawings labeled 3(a)(b), 4, 5, and 7.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. 35 U.S.C. §102-First Rejection

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Katz (5365490)

B. 35 U.S.C. §102-Second Rejection

Claims 8, 13-16, 18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Zell (5326050).

C. 35 U.S.C. §103-Third Rejection

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katz (5365490) and in view of Lisy et al (6105904).

D. 35 U.S.C. §103-Forth Rejection

Claims 9-10, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zell (5326050) and in view of Lisy et al (6105904).

E. 35 U.S.C. §103-Fifth Rejection

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zell (5326050) and in view of Katz (5365490).

VII. ARGUMENT

A. Grouping of the Claims

The claims do not stand and fall together. More particularly, the following grouping of claims: Claim(s) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 & 20, 16, 17, 18, 19, stand as separately patentable claims. Claim 1 is directed to a missile or aircraft comprising at least one deployable flow effector on the missile or aircraft forebody, at least one sensor with a signal positioned to detect flow separation on the missile or aircraft forebody, and a closed loop control system used to activate or deactivate at least one flow effector based on the signal. Claim 2 is directed to the missile or aircraft of Claim 1 wherein the closed loop system activates or deactivates the at least one flow effector to minimize side forces on the missile or aircraft forebody. Claim 3 is directed to

the missile or aircraft of Claim 1 wherein the closed loop system activates or deactivates the at least one flow effector to create commanded side forces on the missile or aircraft forebody. Claims 4 and 5 are directed to the missile or aircraft of Claims 2 and 3, wherein the closed loop system activates the flow effector(s) by oscillation. Claims 6 and 7 are directed to the missile or aircraft in Claims 4 and 5, wherein the flow effector(s) is only activated at high angles of attack. Claim 8 is directed to a flow control system for a missile or aircraft forebody comprising at least one activatable flow effector, at least one sensor to detect flow separation, an inertial measurement unit, and a closed loop control system to activate or deactivate the at least one flow effector. Claim 9 is directed to the flow control system of Claim 8, comprising at least four activatable flow effectors, and Claim 10 comprises at least six, positioned equi-distantly about a center of the forebody of a missile or aircraft. Claims 11-12 are directed to the flow control system of Claim 8, wherein the flow effectors are capable of being activated or deactivated at frequencies of at least 1 Hz, and more preferably at least 20 Hz. Claim 13 is directed to the flow control system of claim 8, wherein the flow effector(s) is activated and deactivated to create commanded side forces on the missile or aircraft forebody. Claim 14 is directed to the flow control system of Claim 1, wherein the flow effector(s) is activated and deactivated to create additional side forces on the missile or aircraft forebody. Claim 15 is directed to a method of stabilization for a missile or aircraft forebody comprising the steps of estimating or determining side forces on a missile or aircraft forebody based a signal from at least one sensor, a closed loop control system that activates at least one flow effector by oscillation, reevaluates the side forces, and deactivates the flow effector(s) in response to reduced or changed side forces. Claim 16 is directed to the method of claim

15, wherein the flow effector(s) is activated by oscillation. Claim 17 is directed to the method of Claim 15, where in the missile or aircraft forebody comprises at least six activatable flow effectors are positioned equi-distantly about a center of the forebody of the forebody of the missile or aircraft. Claims 18 and 19 are directed to the method of claim 15, wherein the forebody of the missile or aircraft is designed with asymmetries in the forebody, and the flow effector(s) is only activated at high angles of attack.

B. Claim 1 is patentable under 35 U.S.C. §102 as being unanticipated by Katz (5365490).

Claim 1 stands rejected stands rejected under 35 U.S.C. 102(b) as being anticipated by Katz (5365490).

Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *W.L. Gore & Associates v. Garlock*, 721 F.2d 1540, 202 USPTO 202 (Fed Cir. 1983). It is not enough that the prior art reference disclose all of the claimed elements in isolation, but rather anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. *Lindemann Maschinenfabrik Gmbh v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984). Further, anticipation requires that the prior art reference must be enabling, thus placing the allegedly disclosed matter in the possession of the public. *Akzo N.V. v. U.S. Int'l Trade Comm'n*, 808 F.2d 1471, 1 USPQ 2d. 1241 (Fed Cir. 1986).

The Applicants respectfully submit that the examiner has not made a prima facie case of anticipation with respect to Claim 1.

Katz does not teach or disclose a sensor having a signal and being positioned to detect flow separation or side forces, wherein the signal of the sensor is used in part to activate or deactivate the at least one flow effector. Instead, Katz teaches the use of pressure sensors to detect acoustic signals near a body moving through a fluid medium. Katz discloses pressure sensors that detect amplitude and pressure fluctuations and provide pressure amplitude data (Column 5, lines 42-47). The sensors detect "both turbulence-induced acoustic signals generated in the fluid medium by the body as it moves through the medium, as well as signals from external acoustic signal sources" (Column 10, lines 40-44), not flow separation or side forces on a missile or aircraft forebody as claimed. The signal from the sensor in Katz is coupled with a noise suppression filter to separate out the turbulence induced acoustic signal so that an acoustic signal generator can drive an acoustic transducer to "inject an opposite-phase acoustic signal" to "reduce or eliminate the turbulence-induced acoustic signals" by the body as it moves through the fluid medium (Column 10, line 54 to Column 11, line 21). Katz teaches the use of a noise suppression device for reducing noise related drag as the body in Katz moves through a fluid medium at or near a zero degree angle of attack. Katz does not teach of at least one flow effector on a missile or aircraft forebody, but rather of a body moving through a fluid medium where an acoustic transducer is activated at or near zero degree angles of attack and most likely not located on the forebody. Conversely, the present invention teaches of sensors that detect flow separation or side forces, and transmit a signal that controls the activation, or deactivation of the flow effector(s) allowing better control of the missile or aircraft at high angles of attack.

The Applicants respectfully submit that the Examiner has failed to meet the burden of proof to establish a prima facie case of anticipation, which requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. *Lindemann Maschinenfabrik Gmbh v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

C. Claims 8, 13-16, 18, and 20 are patentable under 35 U.S.C. 102(b) as being unanticipated by Zell (5326050).

Claims 8, 13-16, 18, and 20 stand rejected under 35 U.S.C. 102(b) as being anticipated by Zell (5326050).

As stated above (and incorporated by reference), anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *W.L. Gore & Associates v. Garlock*, 721 F.2d 1540, 202 USPTO 202 (Fed Cir. 1983). Applicants respectfully submit that the Examiner has not established a prima facie case of anticipation with respect to Claims 8, 13-16, 18, and 20.

1. Claims 8, 13 and 14

With respect to Claim 8, Zell does not teach or disclose a number of elements of Claim 8. Zell does not teach or disclose 1) a flow control system with at least one sensor having a signal, the at least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; 2) a closed loop control system; 3) an inertial measurement unit having an output; or 4) wherein the closed loop control system is used for activating and deactivating the at least one flow effector based in part on the signal of the at least one sensor and the output of the inertial measurement unit.

Zell instead teaches of a surface distention system, which is connected to a flight control 58 "located inside the cock pit and operated by the pilot" which sends the signal to a valve actuator (Column 5, lines 22-37) not to a closed loop control system as claimed. Zell discloses a manually operated system. Conversely, the present invention describes a closed loop system where the sensors detect flow separation or side forces and an inertial measurement unit having an output both directly transmit their signals to a closed loop controller to activate or deactivate the flow effector(s). The closed loop controller is required unlike Zell which suggests only manual intervention by the pilot

The Examiner argues that the flight control 58 is an inertial measurement unit, but that simply is not the case. The flight control in Zell (Column 5, lines 35-36) is "operated by the pilot" and "sends a control signal to a valve actuator 60 to effect changes in the valve position as required by the pilot."

In addition to the comments about Claim 8, with respect to claim 13, Zell further does not teach or disclose a closed loop control system which activates and deactivates the at least one flow effector to create commanded side forces on the missile or aircraft forebody. Instead, the flight control 58 in Zell is operated by the pilot. In addition to the comments about Claim 8, with respect to Claim 14, Zell further does not teach or disclose a flow control system where the flow effectors are capable of being activated and deactivated at frequencies of at least 20 Hz, or a closed loop control system which activates or deactivates the at least one flow effector to create additional side forces on the missile or aircraft forebody. In fact, since the flight control 58 in Zell is operated by the pilot, it would be very difficult for the pilot to switch it on and off at a rate of at least

20 times per second. The Applicants are also perplexed as to why the Examiner believes Claim 14 is anticipated by Zell when Claim 12 on which it depends is not.

Zell does not disclose each and every element of the Applicant's claims therefore the Examiner has not met the burden of proof sufficient to establish a prima facie case of anticipation. *Lindemann Maschinenfabrik Gmbh v. American Hoist & Derrick Co.,* 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

3. Claims 15, 16, 18 and 20

With respect to Claims 15, 15, 18 and 20, Zell does not teach or disclose a method of maneuvering a missile or aircraft forebody including the steps of 1) estimating or determining side forces on a missile or aircraft forebody using a sensor being positioned to estimate or determine side forces on the missile or aircraft forebody, the missile or aircraft forebody further comprising...a closed loop control system for controlling the at least one flow effector, 2) activating at least one flow effector to change the side forces based in part on the signal from the at least one sensor, 3) re-estimating or determining the side forces, or 4) deactivating the flow effector in response to the changed side forces. Zell does not disclose or even allude to a sensor(s). Furthermore, as described above Zell discloses a flow control valve that is controlled by the pilot inside the cockpit, not the sensors that transmit signals independently of any pilot to a closed loop control system, which activates and deactivates a flow effector.

With respect to Claim 16, Zell also does not teach or disclose a method of maneuvering wherein the at least one flow effector is activated by oscillation. The inflatable members described in Zell apparently are turned on and off and there is no hint nor does it seem plausible that they are even capable of oscillation.

With respect to Claim 18, Zell also does not teach or disclose a method of maneuvering wherein the forebody of the missile or aircraft is designed with asymmetries in the forebody.

D. Conclusion

For at least the reasons given above, Applicants assert that the Examiner has failed to make a prima facie case of anticipation, and respectfully request that the Board reverse the §102 rejections and find claims 1, 8, 13, 14, 15, 16, 18, and 20 allowable.

The Applicants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the pending claims 1, 8, 13, 14, 15, 16, 18, and 20.

E. Claims 2-6 are patentable under 35 USC §103 over Katz ('490) and in view of Lisy et al. (6105904).

Claims 2-6 stand rejected under 35 USC §103 as being unpatentable over Katz ('490) and in view of Lisy et al. (6105904).

1. Standard of Review:

> To reach a proper conclusion under 35 USC §103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made. In the light all the evidence, the decisionmaker must then determine whether...the claimed invention as a whole would have been obvious at that time to that person. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts.

Panduit Corp. v. Dennison Mfg. Co., 810 F2d 1561, 1566, 1 USPQ2d 1593, 1595 96 (Fed. Cir. 1987).

2. Prima facie Obviousness

A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. *In re Rickaert,* 9 F.3d 1531; 28 U.S.P.Q.2d (BNA) 1955 (Fed. Cir. 1993). The Patent and Trademark examiner bears the initial burden of presenting a prima facie case of obviousness, only shifting to the applicant if the burden is met.

The Applicants respectfully submit that the Examiner has not made a prima facie case of obviousness with respect to Claims 2-6.

In addition to the above comments with respect to Katz, with respect to Claim 2 neither Katz nor Lisy ('904) teach or disclose activating or deactivating at least one flow effector to minimize flow separation or change side forces on a missile or aircraft forebody. Furthermore, Lisy does not teach or disclose as the Examiner alleges multiple flow effectors arranged around the nose cone presumably of a missile, of flow effectors on a missile or aircraft forebody, of at least one sensor being positioned to detect flow separation or side forces on a missile or aircraft forebody, of a closed loop control system for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor. In addition to the above comments with respect to Claim 3, neither Katz nor Lisy teach or disclose a closed loop control system that activates and deactivates the at least one flow effector to create commanded side forces on a missile or aircraft forebody. In addition to the above comments with respect to Claims 4 and 5, neither Katz nor Lisy teach or disclose a closed loop control system that activates the at least one flow effector by oscillation. In addition to the above comments with respect to Claims 6 and 7, neither Katz nor Lisy teach or disclose a closed loop

control system wherein the flow effector is only activated at angles of attack of the missile or aircraft forebody of between 20 to about 60 degrees.

The Applicants further submit that the Examiner has not given any reason, suggestion, or motivation in the references, or from the references cited as a whole for the person of ordinary skill to have combined or modified the references. "When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." *In re Rouffet, 149* F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998). Furthermore, "rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570, 38 U.S.P.Q.2D (BNA)1554 (Fed. Cir. 1996). Therefore in order to prevent the use of hindsight based on the invention the examiner must show reasons that the skilled artisan, confronted with the same problem as the inventor and with no known knowledge of the claimed invention, would select the elements from the cited prior art references for combination. *In re Rouffet,* 149 F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet,* 149 F.3d 1350, 1357, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants submit that the Examiner has not established any of the above reasons as to motivation to combine. Examiner states that it would have been obvious to

one having ordinary skill in the art at the time the invention was made to substitute the flow effectors of Lisy et al ('904) for that of Katz ('490) around the nose of an air vehicle to control side forces. The Examiner has not however, explained what specific understanding or technological principal within the knowledge of one of ordinary skill in the art would have suggested in the combination. According to *Rouffet*, this lack of explanation led the court to infer that the examiner selected the references with the assistance of hindsight. *In re Rouffet,* 149 F.3d 1350, 1358, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants respectfully disagree with the validity of combining the references both due to the different class status of the inventions, and further because the Examiner has not provided any reason, suggestion, or motivation in the references, or from the references cited as a whole for the person of ordinary skill to have combined or modified the references. Lisy ('904) is listed under U.S. Class 244, Aeronautics and Astronautics, while Katz falls primarily under U.S. Class 364; Communications, Electrical: Acoustic Wave System and Devices. Applicants agree that Lisy ('904) is within the scope and content of the present invention however, Katz ('490) is not even within the same or similar class. Further, the Applicants submit that it is not obvious to one skilled in the art to combine without some teaching or suggestion supporting such combination. The Applicants have continuously requested from the Examiner that if such suggestion or incentive is in the references, that the Examiner particularly point out the relevant sections of those references. The Applicants have also suggested that if the Examiner is alleging that a person of ordinary skill would have been motivated to combine such references, such knowledge must be personal to the Examiner, and therefore the

Applicants respectfully request that the Examiner submit an official affidavit as per prior requests detailing as specifically as possible such motivation (see 37 CFR §1.104 (d)(2)).

In re Eynde, 480 F.2d 1364, 1370, 178 USPQ 470, 474 (CCPA 1973) states that "The facts constituting the state of the art are normally subject to the possibility of rational disagreement among reasonable men [and women] and are not amenable to the taking of [judicial] notice." The Examiner stated in his rejections that it would have been obvious to a person of ordinary skill in the art at the time the invention to combine the references. MPEP 2144.03 B states that the "holding ...[of] general conclusions concerning what is "basic knowledge"...to one of ordinary skill in the art without specific factual findings and some concrete evidence in the record to support these findings will not support an obviousness rejection." MPEP 2144.03 goes on further to say "The examiner must point to some concrete evidence in the record in support of these findings to support the substantial evidence test....If the Examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding."

Given the reasons in this appeal, Applicants respectfully request withdrawal of his rejection.

F. Claims 9-10, 17, and 19 are patentable under 35 U.S.C. 103(a) over Zell (5326050) in view of Lisy et al. (6105904)

Claims 9-10, 17, and 19 stand rejected under U.S.C. §103(a) over Zell ('050) in view of Lisy et al. ('904). The Applicants respectfully submit that the Examiner has not made a prima facie case of obviousness with respect to Claims 9-10, 17 and 19.

As noted above, a prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. *In re Rickaert*, 9 F.3d 1531, 1532; 28 U.S.P.Q.2d (BNA) 1955 (Fed. Cir. 1993). The Patent Examiner bears the initial burden of presenting a prima facie case of obviousness, only shifting to the applicant if the burden is met. With all due respect, it appears that the Examiner is attempting to shift his burden of making a prima facie case rejection onto the Applicants, in effect forcing the Applicants to disprove that the prior art provides a suggestion or incentive to combine. This is not the Applicants' burden of proof.

In addition to the above comments with respect to Zell with respect to independent Claim 8, Lisy does not teach nor disclose at least one sensor having a signal, the at least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; an inertial measurement unit having an output; a closed loop control system; or wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor and the output of the inertial measurement unit. In addition with respect to Claim 10, neither Lisy nor Zell disclose or teach of a flow control system comprising at least six flow effectors wherein the at least six flow effectors are positioned and separated substantially equi-distantly about a center of the forebody of the missile or aircraft. In addition to the above comments with respect to Zell with respect to independent Claims 15, Lisy does not teach nor disclose a method of maneuvering a missile or aircraft forebody including the steps of 1) estimating or determining side forces on a missile or aircraft forebody using a sensor being positioned to estimate or determine side forces on

the missile or aircraft forebody, the missile or aircraft forebody further comprising ....a closed loop control system for controlling the at least one flow effector 2) activating at least one flow effector to change the side forces based in part on the signal from the at least one sensor, 3) re-estimating or determining the side forces, or 4) deactivating the flow effector in response to the changed side forces. In addition with respect to Claim 17, neither Lisy nor Zell disclose or teach of a flow control system comprising at least six flow effectors wherein the at least six flow effectors are positioned and separated substantially equi-distantly about a center of the forebody of the missile or aircraft. In addition with respect to claim 19 neither Lisy nor Zell teach or disclose a closed loop control system wherein the flow effector is only activated at angles of attack of the missile or aircraft forebody of between 20 to about 60 degrees.

The Applicants further submit that the Examiner has not given any reason, suggestion, or motivation in the references, or from the references cited as a whole for the person of ordinary skill to have combined or modified the references. "When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." *In re Rouffet, 149* F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998). Furthermore, "rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570, 38 U.S.P.Q.2D (BNA) 1554 (Fed. Cir.1996). Therefore in order to prevent the use of hindsight based on the invention the examiner must show reasons that the skilled artisan, confronted with the same problem as the inventor and with no known knowledge

of the claimed invention, would select the elements from the cited prior art references for combination. *In re Rouffet,* 149 F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet,* 149 F.3d 1350, 1357, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants submit that the Examiner has not established any of the above reasons as to motivation to combine. Examiner states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the references. The Examiner has not however, explained what specific understanding or technological principal within the knowledge of one of ordinary skill in the art would have suggested in the combination. According to *Rouffet*, this lack of explanation led the court to infer that the examiner selected the references with the assistance of hindsight. *In re Rouffet,* 149 F.3d 1350, 1358, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants have continuously requested that if such suggestion or incentive is in the references, that the Examiner particularly point out the relevant sections of those references, particularly given the large difference in the types of devices described by these two references and their applications. The Applicants have also suggested that if the Examiner is alleging that a person of ordinary skill would have been motivated to combine such references, such knowledge must be personal to the Examiner, and therefore the Applicants respectfully request that the Examiner submit an official

affidavit as per prior requests detailing as specifically as possible such motivation (see 37 CFR §1.104 (d)(2)).

In re Eynde, 480 F.2d 1364, 1370, 178 USPQ 470, 474 (CCPA 1973) states that "The facts constituting the state of the art are normally subject to the possibility of rational disagreement among reasonable men [and women] and are not amenable to the taking of [judicial] notice." The Examiner stated in his rejections that it would have been obvious to a person of ordinary skill in the art at the time the invention to combine the references. MPEP 2144.03 B states that the "holding ...[of] general conclusions concerning what is "basic knowledge"...to one of ordinary skill in the art without specific factual findings and some concrete evidence in the record to support these findings will not support an obviousness rejection." Section MPEP 2144.03 goes on further to say "The examiner must point to some concrete evidence in the record in support of these findings to support the substantial evidence test....If the Examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding."

Given the reasons in this appeal, Applicants respectfully request withdrawal of his rejection.

G. Claims 11-12 are patentable under 35 U.S.C. 103(a) over Zell (5326050) in view of Katz.

Claims 11-12 stand rejected under U.S.C. §103(a) over Zell ('050) in view of Katz ('490). The Applicants respectfully submit that the Examiner has not made a prima facie case of obviousness with respect to Claims 11-12.

As stated above, the Examiner has the burden under 35 USC §103 to establish a prima facie case of obviousness. *In re Fine*, 837 F.2d 1071, 1074; 5 U.S.P.Q.2D (BNA) (Fed. Cir.1988). A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. *In re Rickaert,* 9 F.3d 1531; 28 U.S.P.Q.2d (BNA) 1955 (Fed. Cir. 1993).

In addition to the above comments with respect to Zell with respect to independent Claims 8, Katz does not teach nor disclose at least one sensor having a sensor, the at least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; an inertial measurement unit having an output; a closed loop control system; or wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor and the output of the inertial measurement unit. Instead, Katz teaches the use of pressure sensors to detect acoustic signals near a body moving through a fluid medium. Katz discloses pressure sensors that detect amplitude and pressure fluctuations and provide pressure amplitude data (Column 5, lines 42-47). The sensors detect "both turbulence-induced acoustic signals generated in the fluid medium by the body as it moves through the medium, as well as signals from external acoustic signal sources" (Column 10, lines 40-44), not flow separation or side forces on a missile or aircraft forebody as claimed. The signal from the sensor in Katz is coupled with a noise suppression filter to separate out the turbulence induced acoustic signal so that an acoustic signal generator can drive an acoustic transducer to "inject an opposite-phase acoustic signal" to "reduce or eliminate the turbulence-induced acoustic signals" by the

body as it moves through the fluid medium (Column 10, line 54 to Column 11, line 21). Katz teaches the use of a noise suppression device for reducing noise related drag as the body in Katz moves through a fluid medium at or near a zero degree angle of attack. Katz does not teach of at least one flow effector on a missile or aircraft forebody, but rather of a body moving through a fluid medium where an acoustic transducer is activated at or near zero degree angles of attack and most likely not located on the forebody. Conversely, the present invention teaches of sensors that detect flow separation or side forces, and transmit a signal along with an output from an inertial measurement unit that controls the activation, or deactivation of the flow effector(s) allowing better control of the missile or aircraft at high angles of attack.

In addition to the comments with respect to Katz and Zell, with respect to Claims 11 and 12, neither Katz nor Zell disclose or teach of a flow control system wherein the flow effectors are capable of being activated and deactivated at frequencies of at least 1 Hz and more preferably at least 20 Hz respectively.

The Examiner in his Final Rejection quoted Katz, Col. 10 stating "(24) The new method provides a number of advantages. In particular, it provides a relatively inexpensive and very reliable method for detecting the onset of turbulence in a fluid medium caused by a body moving in the medium." The Applicants respectfully submit that they are not sure whether the Examiner is now on Final Rejection submitting this newly cited line from Katz as a suggestion or incentive to combine the prior art. They further point out that the Examiner apparently is missing one of the primary advantages of the present invention, which is to provide a flow effector to reattach flow or to create side forces and thus the need for a sensor positioned to detect flow separation or side

forces encountered at high angles of attack. The turbulent flow described in Katz is experienced at low angles of attack thus requiring a different type of sensor, and therefore teaching away from the present invention.

Prior to Final Rejection, the Applicants submit that the Examiner had not given any reason, suggestion, or motivation in the references or from the references cited as a whole for the person of ordinary skill to have combined or modified the references. "When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." *In re Rouffet, 149* F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998). Furthermore, "rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570, 38 U.S.P.Q.2D (BNA)1554 (Fed. Cir. 1996). Therefore in order to prevent the use of hindsight based on the invention the examiner must show reasons that the skilled artisan, confronted with the same problem as the inventor and with no known knowledge of the claimed invention, would select the elements from the cited prior art references for combination. *In re Rouffet,* 149 F.3d 1350, 1355, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet,* 149 F.3d 1350, 1357, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants submit that the Examiner has not established any of the above reasons as to motivation to combine. The Examiner stated that it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the references. The Examiner did not however, explain what specific understanding or technological principal within the knowledge of one of ordinary skill in the art would have suggested in the combination. According to *Rouffet*, this lack of explanation led the court to infer that the examiner selected the references with the assistance of hindsight. *In re Rouffet,* 149 F.3d 1350, 1358, 47 U.S.P.Q.2d (BNA) 1453 (Fed. Cir. 1998).

The Applicants have continuously requested that if such suggestion or incentive is in the references, that the Examiner particularly point out the relevant sections of those references, particularly given the large difference in the types of devices described by these two references and their applications. The Applicants have also suggested that if the Examiner is alleging that a person of ordinary skill would have been motivated to combine such references, such knowledge must be personal to the Examiner, and therefore the Applicants respectfully request that the Examiner submit an official affidavit as per prior requests detailing as specifically as possible such motivation (see 37 CFR §1.104 (d)(2)).

In re Eynde, 480 F.2d 1364, 1370, 178 USPQ 470, 474 (CCPA 1973) states that "The facts constituting the state of the art are normally subject to the possibility of rational disagreement among reasonable men [and women] and are not amenable to the taking of [judicial] notice." The Examiner stated in his rejections that it would have been obvious to a person of ordinary skill in the art at the time the invention to combine the

references. MPEP 2144.03 B states that the "holding ...[of] general conclusions concerning what is "basic knowledge"...to one of ordinary skill in the art without specific factual findings and some concrete evidence in the record to support these findings will not support an obviousness rejection." Section MPEP 2144.03 goes on further to say "The examiner must point to some concrete evidence in the record in support of these findings to support the substantial evidence test....If the Examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding."

Given the reasons in this appeal, Applicants respectfully request withdrawal of his rejection.

H. Conclusion

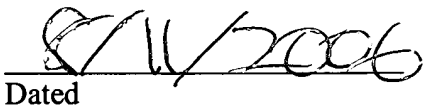
For at least the reasons given above, Applicants assert that the Examiner has failed to make a prima facie case of obviousness, and respectfully request that the Board reverse the §103 rejections and find Claims 2-6, 9-10, 17, 19, 11, and 12 allowable.

Applicants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the claims.

If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 502704. If a fee is required

for an extention of time under 27 C.F.R. §1.136 not accounted for above, such extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,



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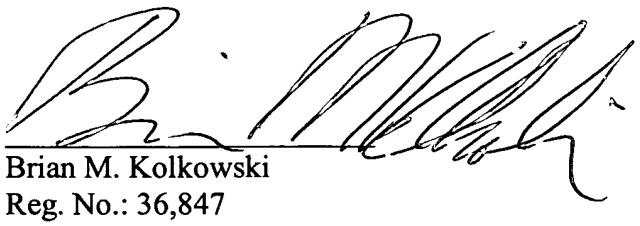

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VIII. CLAIMS APPENDIX

1. A missile or aircraft comprising

   a. an afterbody and a forebody;

   b. at least one flow effector on the missile or aircraft forebody;

   c. at least one sensors each having a signal, the at least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; and

   d. a closed loop control system;

   wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor.

2. The missile or aircraft in claim 1, wherein the closed loop control system activates and deactivates the at least one flow effector to minimize flow separation or change side forces on the missile or aircraft forebody.

3. The missile or aircraft in claim 1, wherein the closed loop control system activates and deactivates the at least one flow effector to create commanded side forces on the missile or aircraft forebody.

4. The missile or aircraft in claim 2, wherein the closed loop control system activates the at least one flow effector by oscillation.

5. The missile or aircraft in claim 3, wherein the closed loop control system activates the at least one flow effector by oscillation.

6. The missile or aircraft in claim 4, wherein the closed loop control system only activates the at least one flow effector at angles of attack of the missile or aircraft forebody of between about 20 to about 60 degrees.

7. The missile or aircraft in claim 5, wherein the closed loop control system only activates the at least one flow effector at angles of attack of the missile or aircraft forebody of between about 20 to about 60 degrees.

8. A flow control system for a missile or aircraft forebody comprising

a. at least one flow effector[[s]];

b. at least one sensor having a signal, the at least one sensor being positioned to detect flow separation or side forces on the missile or aircraft forebody; and

c. an inertial measurement unit having an output;

d. a closed loop control system;

wherein the closed loop control system is used for activating and deactivating the at least one flow effector based on at least in part the signal of the at least one sensor and the output of the inertial measurement unit.

9. The flow control system in claim 8, comprising at least four flow effectors.

10. The flow control system in claim 8, comprising at least six flow effectors wherein the at least six flow effectors are positioned and separated substantially equi-distantly about a center of the forebody of the missile or aircraft.

11. The flow control system in claim 8, wherein the flow effectors are capable of being activated and deactivated at frequencies of at least 1 Hz.

12. The flow control system in claim 8, wherein the flow effectors are capable of being activated and deactivated at frequencies of at least 20 Hz.

13. The flow control system in claim 8, wherein the closed loop control system activates and deactivates the at least one flow effector to create commanded side forces on the missile or aircraft forebody.

14. The flow control system in claim 12, wherein the closed loop control system activates and deactivates the at least one flow effector to create additional side forces on the missile or aircraft forebody.

15. A method of maneuvering a missile or aircraft forebody comprising the steps of

a. estimating or determining side forces on a missile or an aircraft forebody based at least in part on a signal from at least one sensor, the at least one sensor

being positioned to estimate or determine side forces on the missile or aircraft forebody; the missile or aircraft forebody further comprising at least one flow effector and a closed loop control system for controlling the at least one flow effector;

b. activating the at least one flow effector[[s]] to change the side forces by activation of the at least one flow effector with the closed loop controller based on at least in part the signal of the at least sensor; and

c. re-estimating or determining side forces on the missile or aircraft forebody based at least in part on a signal from the at least one sensor; and

d. deactivating the at least one flow effector in response to changed side forces.

16. The method of maneuvering in claim 15, wherein the at least one flow effector is activated by oscillating the at least one flow effector.

17. The method of maneuvering in claim 15, wherein the missile or aircraft forebody comprises at least six flow effectors wherein the at least six flow effectors are positioned and separated substantially equi-distantly about a center of the forebody of the missile or aircraft.

18. The method of maneuvering in claim 15, wherein the forebody of the missile or aircraft is designed with asymmetries in the forebody.

19. The method of maneuvering in claim 15, wherein the at least one flow effector is only activated at angles of attack of the missile or aircraft forebody of between about 20 to about 60 degrees.

20. The method of maneuvering in claim 15, wherein the at least one flow effector is a deployable flow effector.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

No related appeals or interference